

Problem 1.1 Interpreting Tables

- A. Do the jumping jack experiment. For each jumper, prepare a table for recording the total number of jumping jacks after every 10 seconds, up to a total time of 2 minutes (120 seconds).

Jumping Jack Experiment

Time (seconds)	0	10	20	30	40	50	60	70	...
Total Number of Jumping Jacks									

Use the table of your jumping jack data to answer these questions:

- B. How did the jumping jack rates (the number of jumping jacks per second) in your group change as time passed? How is this shown in your tables?
- C. What might this pattern suggest about how bike-riding speed would change over a day's time on the bicycle tour?

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1.2 Making Graphs

In the jumping jack experiment, the number of jumping jacks and the time are variables. A **variable** is a quantity that changes or varies. You recorded data for the experiment variables in a table. Another way to display your data is in a **coordinate graph**. Making a coordinate graph is a way to show the relationships between two variables.

There are four steps to follow when you make a coordinate graph.

Step 1 Identify two variables.

In Problem 1.1, the two variables are *time* and *number of jumping jacks*.

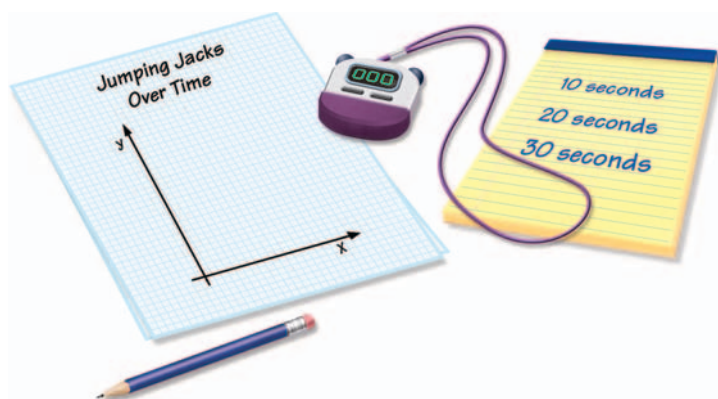
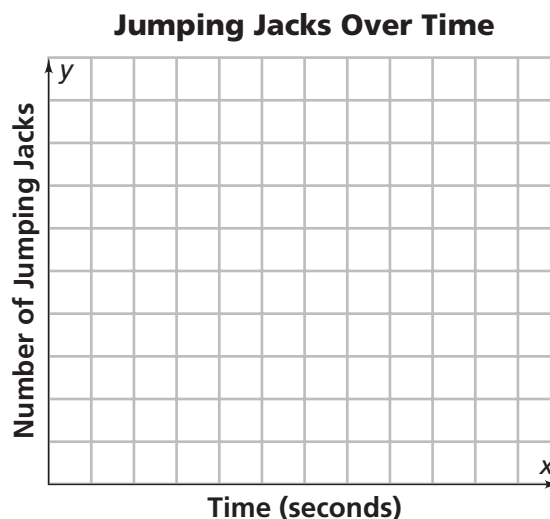
Step 2 Select an axis to represent each variable.

Often, you can assign each variable to an axis by thinking about how the variables are related. If one variable depends on the other, put the **dependent variable** on the **y-axis** (the vertical axis) and the **independent variable** on the **x-axis** (the horizontal axis). You may have encountered the terms *dependent variable* and *independent variable* in your science classes.

If time is a variable, you usually put it on the x -axis. This helps you see the “story” that occurs over time as you read the graph from left to right.

In Problem 1.1, the number of jumping jacks depends on time. So, put number of jumping jacks (the dependent variable) on the y -axis and time (the independent variable) on the x -axis.

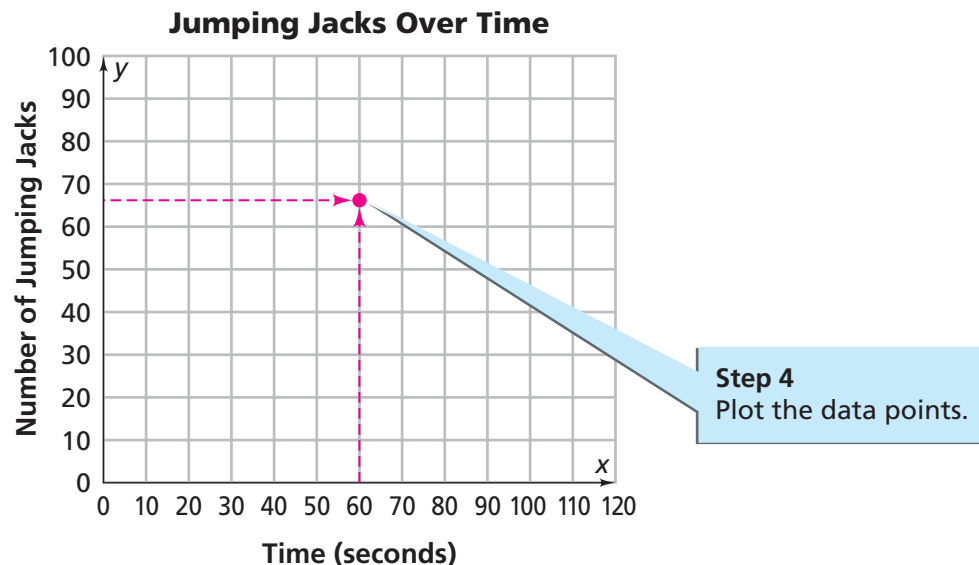
Label your graph so that someone else can see what it represents. You can label the x -axis as “Time (seconds)” and the y -axis as “Number of Jumping Jacks.” You can use these labels to help you choose a title for your graph. You might title this graph, “Jumping Jacks Over Time.”



Step 3 Select a **scale** for each axis. For each axis, determine the least and greatest values to show. Then decide how to space the scale marks.

In Problem 1.1, the values for time are between 0 and 120 seconds. On the graph, label the x -axis (time) from 0 to 120. Because you collected data every 10 seconds, label by 10's.

The scale you use on the y -axis (number of jumping jacks) depends on the number of jumping jacks you did. For example, if you did 97 jumping jacks, you could label your scale from 0 to 100. Because it would take a lot of space to label the scale for every jumping jack, you could label by 10's.



Step 4 Plot the data points.

Suppose that at 60 seconds, you had done 66 jumping jacks. To plot this information, start at 60 on the x -axis (time) and follow a line straight up. On the y -axis (number of jumping jacks), start at 66 and follow a line straight across. Make a point where the two lines intersect. You can describe this point with the **coordinate pair** (60, 66). The first number in a coordinate pair is the x -coordinate, and the second number is the y -coordinate.

Problem 1.2 Making Graphs

- A. Make a graph of the jumping jack data for one of the jumpers in your group.
- B. What does your graph show about the jumping jack rate as time passes?
(Another way to say this is, what does your graph show about the **relationship** between the number of jumping jacks and time?)
- C. Is the relationship you found between the number of jumping jacks and time easier to see in the table or in the graph? Explain.

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